CLAIMS

1. A communication device comprising: a first path having a little delay; and a second path to which more delay than the delay of said first path occurs, comprising:

a transmission section separating a processing on said first path and a processing on said second path in units of tones, allowing a buffer on said first path to secure a transmission rate to an extent that communication can be held and then outputting data on the communication without being encoded, and allowing a buffer on said second path to secure remaining tones and then turbo-encoding and outputting bits on the tones; and

a receiving section allocating Fourier-transformed frequency data to said first path and said second path in units of tones, respectively, and hard-determining bits on the tones allocated to said first path and turbo-decoding bits on the tones allocated to said second path.

2. A communication device comprising: a first path having a little delay; and a second path to which more delay than the delay of said first path occurs, comprising:

a transmission section predetermining the number of bits allocated to a buffer on said first path and a buffer on said second path, respectively, outputting the bits on tones allocated to the buffer on said first path without

being encoded by a tone ordering processing, outputting the bits on tones allocated to the buffer on said second path with being turbo-encoded, and if the allocated tones spread over the two buffers, individually processing the tones on the both paths; and

a receiving section allocating Fourier-transformed frequency data to said first path and said second path in units of tones, respectively, hard-determining the bits on the tones allocated to said first path and turbo-decoding the bits on the tones allocated to said second path, and individually processing the tones spreading over said two buffers on the both paths.

3. A communication device comprising: a first path having a little delay; and a second path to which more delay than the delay of said first path occurs, comprising:

a transmission section allocating bits, other than lower two bits, of respective tones to a buffer on said first path from a bitmap obtained based on an S/N ratio and then outputting the bits allocated to the buffer without being encoded, and allocating the remaining lower two bits to a buffer on said second path and then turbo-encoding and outputting the bits allocated to the buffer; and

a receiving section allocating the tones including the bits which are not encoded in Fourier-transformed

frequency data to said first path and the tones including the turbo-encoded bits to said second path, respectively, and then hard-determining the bits on the tones allocated to said first path and turbo-decoding the bits on the tones allocated to said second path.

4. A communication device comprising: a first recursive organization convolutional encoder convolutional-encoding an information bit sequence of one system and outputting first redundant data; a second recursive organization convolutional encoder convolutional-encoding the information bit sequence after being interleaved and outputting second redundant data; and a puncturing circuit thinning out each redundant data at predetermined timing and outputting one of the redundant bits, wherein

if the recursive organization convolutional encoder having a constraint length of "5" and the number of memories is "4" or the constraint length of "4" and the number of memories is "3" is assumed, all connection patterns constituting the encoder are searched; and

the encoder satisfying optimal conditions that a distance between two bits "1" of a self-terminating pattern with a specific block length becomes a maximum and that a total weight becomes a maximum in the pattern having the maximum distance, is provided as each of said first and second

recursive organization convolutional encoders.

5. A communication device comprising: a first path having a little delay; and a second path to which more delay than the delay of said first path occurs, comprising:

a transmission section separating a processing on said first path and a processing on said second path in units of tones, allowing a buffer on said first path to secure a transmission rate to an extent that communication can be held and then outputting data on the communication without being encoded, and allowing a buffer on said second path to secure remaining tones and then turbo-encoding and outputting bits on the tones.

6. A communication device comprising: a first path having a little delay; and a second path to which more delay than the delay of said first path occurs, comprising:

a receiving section allocating Fourier-transformed frequency data to said first path and said second path in units of tones, respectively, and hard-determining bits on the tones allocated to said first path and turbo-decoding bits on the tones allocated to said second path.

7. A communication device comprising: a first path having a little delay; and a second path to which more delay than the delay of said first path occurs, comprising:

a transmission section predetermining the number of bits allocated to a buffer on said first path and a buffer on said second path, respectively, outputting the bits on tones allocated to the buffer on said first path without being encoded by a tone ordering processing, outputting the bits on tones allocated to the buffer on said second path with being turbo-encoded, and if the allocated tones spread over the two buffers, individually processing the tones on the both paths.

8. A communication device comprising: a first path having a little delay; and a second path to which more delay than the delay of said first path occurs, comprising:

a receiving section allocating Fourier-transformed frequency data to said first path and said second path in units of tones, respectively, hard-determining bits on tones allocated to said first path and turbo-decoding bits on tones allocated to said second path, and individually processing the tones spreading over said two buffers on the both paths.

9. A communication device comprising: a first path having a little delay; and a second path to which more delay than the delay of said first path occurs, comprising:

a transmission section allocating bits, other than lower two bits, of respective tones to a buffer on said first path from a bitmap obtained based on an S/N ratio and then outputting the bits allocated to the buffer without being encoded, and allocating the remaining lower two bits to a buffer on said second path and then turbo-encoding and outputting the bits allocated to the buffer.

10. A communication device comprising: a first path having a little delay; and a second path to which more delay than the delay of said first path occurs, comprising:

a receiving section allocating tones including bits, which are not encoded, in Fourier-transformed frequency data to said first path and tones including turbo-encoded bits to said second path, respectively, and then hard-determining the bits on the tones allocated to said first path and turbo-decoding the bits on the tones allocated to said second path.

11. A communication method using: a first path having a little delay; and a second path to which more delay than the delay of said first path occurs, comprising:

a transmission step of separating a processing on said first path and a processing on said second path in units of tones, allowing a buffer on said first path to secure a transmission rate to an extent that communication can be held and then outputting data on the communication without being encoded, and allowing a buffer on said second path to secure remaining tones and then turbo-encoding and outputting bits on the tones; and

a receiving step of allocating Fourier-transformed frequency data to said first path and said second path in units of tones, respectively, and hard-determining bits on the tones allocated to said first path and turbo-decoding bits on the tones allocated to said second path.

12. A communication method using: a first path having a little delay; and a second path to which more delay than the delay of said first path occurs, comprising:

a transmission step of predetermining the number of bits allocated to a buffer on said first path and a buffer on said second path, respectively, outputting the bits on tones allocated to the buffer on said first path without being encoded by a tone ordering processing, outputting the bits on tones allocated to the buffer on said second path with being turbo-encoded, and if the allocated tones spread over the two buffers, individually processing the tones on

the both paths; and

a receiving step of allocating Fourier-transformed frequency data to said first path and said second path in units of tones, respectively, hard-determining the bits on the tones allocated to said first path and turbo-decoding the bits on the tones allocated to said second path, and individually processing the tones spreading over said two buffers on the both paths.

13. A communication method using: a first path having a little delay; and a second path to which more delay than the delay of said first path occurs, comprising:

a transmission step of allocating bits, other than lower two bits, of respective tones to a buffer on said first path from a bitmap obtained based on an S/N ratio and then outputting the bits allocated to the buffer without being encoded, and allocating the remaining lower two bits to a buffer on said second path and then turbo-encoding and outputting the bits allocated to the buffer; and

a receiving step of allocating the tones including the bits which are not encoded in Fourier-transformed frequency data to said first path and the tones including the turbo-encoded bits to said second path, respectively, and then hard-determining the bits on the tones allocated to said first path and turbo-decoding the bits on the tones

allocated to said second path.